contributes the following account. As its author appears to be habitually careful and painstaking in both observation and statement, the description is thought to be of value:

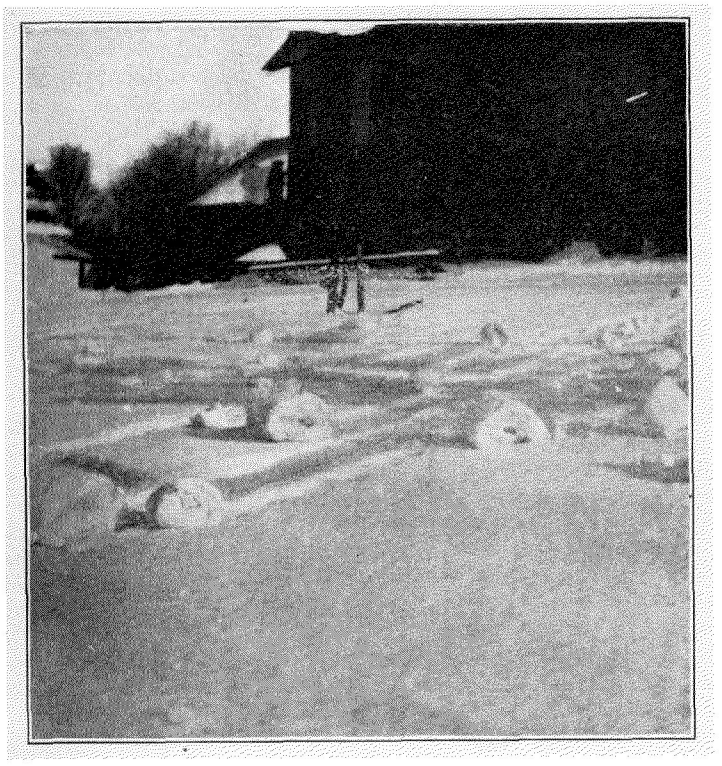

FIG. 1.—Snow rollers at Canton, N. Y., February 20, 1907.

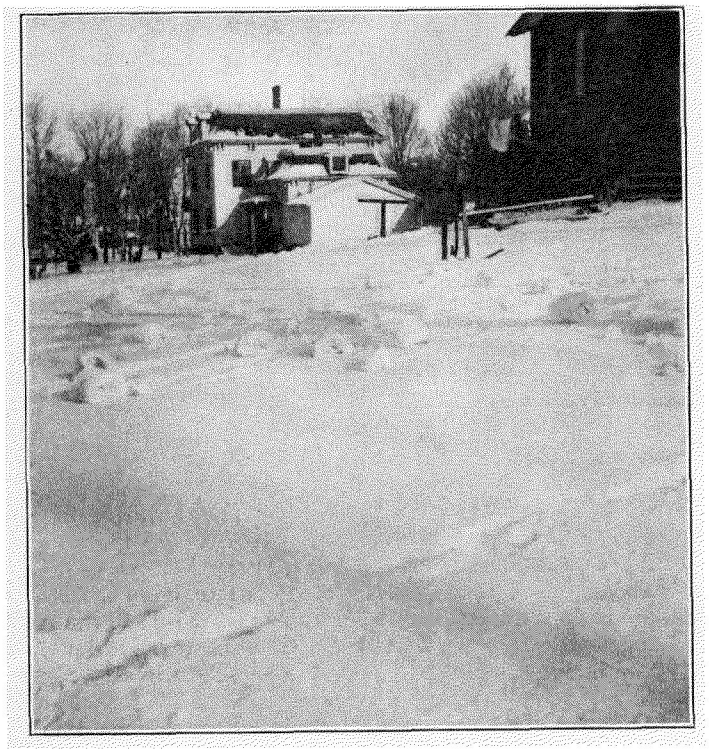

FIG. 2.—Snow rollers at Canton, N Y., February 20, 1907.

During the winter of 1895 I watched the formation and progress of so-called snow rollers. The temperature was probably a trifle above the freezing point, following a snowstorm characterized by very large, light flakes. For the most part the wind seemed to sweep downward and get under a slightly projecting mass of snow and set it in motion. As the roll grew in size the speed, at first very rapid, slackened until the mass became too compact and heavy to be moved farther. Sometimes a triangular shaped "card" of snow, often three or four inches across the base, would rise and fall several times before the wind gained sufficient purchase to turn the point over and start the roller. This card lookt very much like the corner of a piece of paper as it rises and falls with the wind just before it is blown away. The snow seemed to be of an unusual consistency, rendering it tough and flexible.

These rollers were observed at Edenton, St. Lawrence County, N. Y.

## E. SCHARF ON THE EFFECTS OF HAIL ON CROPS[1]

Insurance against damage to growing crops by hail is practised quite extensively in Europe, chiefly by small local associations on the mutual plan. It is to aid in the adjustment of claims under this form of insurance that the present work appears to have been written.

The author begins by defining the three varieties of hail commonly recognized in his section of Germany, viz, "Graupel", the small, opaque, snowy hail of cold weather; "Schlossen", an intermediate form; and "Hagel", or true hail, the frequent accompaniment of summer thunderstorms. Well known facts regarding the distribution of hailstorms in space and time are also summarized.

The bulk of the work, however, is an original study, in great detail, of the effects of hail upon each of the ordinary field crops; these vary with the severity of the storm, with the stage of the crop's growth, and even with the character of the soil and the amount of fertilization, as influencing the vigor of the plants and their ability to withstand the blows of the hailstones. Numerous drawings and photographs make clear the characteristic effects of a hailstorm, and aid one to distinguish these effects from the ravages of wind, insects, and disease.

We believe this is the first treatise of its kind. It should be within the reach of anyone who is interested in hail insurance, whether as an underwriter or a policy holder.—*C. F. T.*

## LONG-RANGE INDIAN MONSOON FORECASTS.

The annual publication by the director of the Meteorological Service of India of a statement of general atmospheric conditions, with an attempt to forecast the general character of the southwest monsoon rainfall, has now proceeded for about twenty years with a variable degree of success, but sufficient to show that the effort at long-range forecasting is really worth while. The work was begun by Blanford, was carried on by Sir John Eliot, and is now in the hands of his successor, Gilbert T. Walker. Pending a more extensive investigation into the philosophy of these seasonal forecasts we quote the following remarks from a review of the subject by Professor Hann, of Vienna, as published in the Meteorologische Zeitschrift for February, 1907.

Blanford thought that he had shown that generally snowfall in the regions to the north and west of India produced an abnormal distribution of pressure over northern India that was unfavorable to the advance of the southwest monsoons over this region; and he adopted the general principle that lower atmospheric pressure over any area increased the amount of its rainfall.

Sir John Eliot showed that the conditions over India alone would not suffice to justify reliable forecasts, and after the year 1894 information as to the conditions over the Indian Ocean was made use of, extending annually farther south, until, in 1897, even Africa and Australia were considered. It seemed most probable that heavier rainfall at Zanzibar and off the Seychelles in May would justify predicting heavier rainfall in India later in the season, when the monsoon has crost over the equator. But later experience showed that the opposite was the case. Then it was assumed that perhaps an abnor-

[1] Scharf, Edmund. Der Hagel. Erkennung, Beschreibung, Beurteilung und Schätzung von Hagelschäden. Halle a. S.: Im Selbstverlage des Verfassers. 1906. vi, 195 p. 12°.